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Para o Desenvolvimento Ambiental, Cultural e Socioeconômico

Xosé Somoza Medina
(organizador)

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PRÓLOGO

Por tercera vez, la editorial Artemis organiza un volumen para promover la difusión de investigaciones originales que desde diferentes ámbitos pretenden promover el desarrollo ambiental, cultural y socioeconómico. En esta ocasión, se trata de catorce trabajos estructurados en dos bloques, Ciencia y Tecnología, como en el volumen precedente, para de esta manera percibir con claridad como desde ambos campos del saber se puede proyectar un mundo mejor.

La ciencia y la tecnología en el siglo XXI deben orientar sus esfuerzos a ofrecer soluciones a los grandes problemas presentes de la humanidad y de nuestro planeta. Las Naciones Unidas iniciaron el camino en el año 2000 con los Objetivos del Milenio, reformulados y ampliados en 2015 con los ahora denominados Objetivos de Desarrollo Sostenible, ODS. Más allá de una simple declaración, los ODS deberían convertirse en el faro guía de todo avance científico o técnico. Lo ideal sería que cada persona científica o tecnóloga, independientemente de su origen o vinculación profesional, pensara en la fase de diseño de la investigación cuál de los ODS contribuye a alcanzar la consecución de su proyecto, para de esta manera orientar los esfuerzos de millones de seres humanos en todo el mundo a resolver el futuro de las próximas generaciones y no al contrario, que el progreso de nuestra civilización suponga una amenaza real para la Tierra, como parece que hemos estado haciendo hasta ahora. Todavía estamos a tiempo de cambiar nuestro destino, pero debemos concienciarnos y actuar en consecuencia.

Con este pensamiento en la mente, los trabajos que presentamos en este volumen adquieren una dimensión mayor. En el primer bloque, Ciencia, se agrupan siete trabajos que desde las ciencias de la educación y las ciencias económicas y empresariales contribuyen a alcanzar esos objetivos enunciados, bien a través de encuestas a una muestra de estudiantes de diferentes carreras universitarias o bien a través del análisis local de casos concretos. Así se pueden desarrollar temas de gran actualidad como la responsabilidad social, la incertidumbre de las políticas monetarias, la importancia de las microempresas en contextos determinados, las redes sociales, la internacionalización del sector turístico, la sostenibilidad en las empresas o la ansiedad provocada por la pandemia.

En el segundo bloque, Tecnología, se agrupan siete investigaciones con aportaciones igual de interesantes y novedosas, como los avances en teledetección de incendios, los tratamientos con bacterias para eliminar los residuos de aceites, la evaluación de antioxidantes en el desarrollo “in vitro” de plantas de caña de azúcar, los análisis informáticos para la predicción de plagas en los cultivos, las técnicas kinésicas para el tratamiento de la incontinencia urinaria femenina, la inteligencia aumentada de usuario o el estudio de un megaproyecto urbanístico como el de Saemangeum en Corea del Sur.

Xosé Somoza Medina
Universidad de León, Espanha

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A STUDY ON THE PROGRAM MANAGEMENT DIRECTION OF MEGAPROJECT FOR SAEMANGEUM DELVELOPMENT IN KOREA

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ABSTRACT: The Megaproject “Saemangeum Development (SD)” is a national program of South Korea to build a “Global Treasure Saemangeum” that will emerge as the economic hub of Northeast Asia, encompassing the economy, business and tourism. SD is to include the world’s longest seawall (33.9km) connecting Gunsan-Buan to create reclaimed land (291 km^2) and a lake (118km^2), and to develop 3.3km^2 of Gogunsan-gun island and 4.9km^2 of a new port. SD is also a program involving various stakeholders such as central administrative agencies (Ministry of Agriculture and Forestry, Ministry of Environment, Ministry of Land, Infrastructure and Transport), local governments (Jeollabuk-do, Gunsan-city, Buan-gun, etc.), Saemangeum Development Corporation, local public institutions and private project implementers. The Saemangeum Development and Investment Agency (SDIA) is in charge of the entire project for successful completion. SDIA needs advanced Saemangeum program management (it is called “K-SPM”) to address

complex issues such as lack of clear scope and timing of termination, high dependence on private investment, frequent policy changes, and confrontation among many stakeholders. In this study, it is to introduce the establishment of procedures, time and cost management, efforts for megaproject developing a program management information system, and the direction of K-SPM development.
KEYWORDS: Saemangeum Development. Megaproject. Program Management. K-SPM (Korea Saemangeum Program Management).

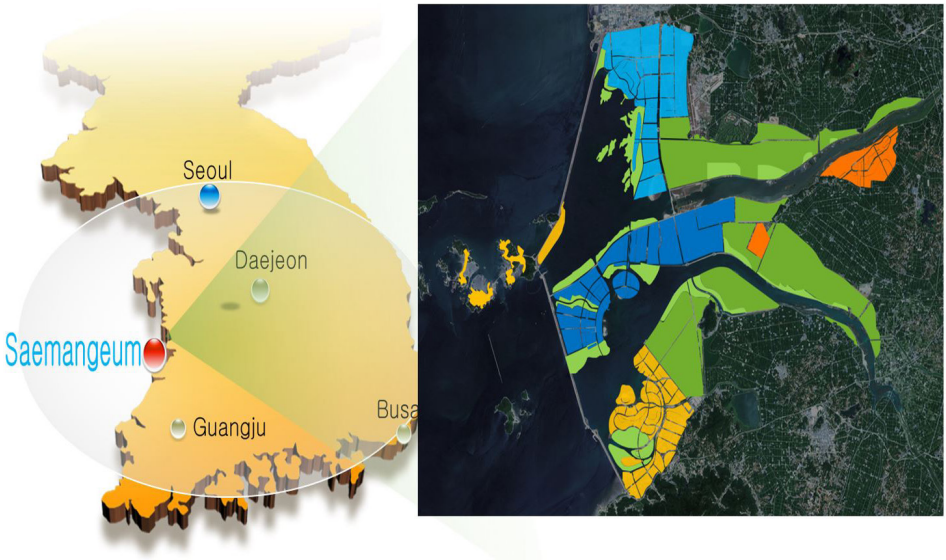
UN ESTUDIO SOBRE LA DIRECCIÓN DE GESTIÓN DEL PROGRAMA DEL MEGAPROYECTO PARA EL DESARROLLO DE SAEMANGEUM EN COREA

RESUMEN: El proyecto "Saemangeum Development (SD)" es un programa nacional de Corea del Sur para construir un "Saemangeum del Tesoro Global" que surgirá como el centro económico del noreste asiático, que abarca la economía, los negocios y el turismo. SD incluirá el más largo mar del mundo (33,9 km) que conecte Gunsan-Buan para crear tierras recuperadas (291km^2) y un lago (118km^2), y desarrollar 3.3 °C de isla de Gogunsan y 4.9 °C de un nuevo puerto. El SD también es un programa que incluye a varios interesados, como los organismos administrativos centrales (Ministério de Agricultura y Silvicultura, Ministerio del Medio Ambiente, Ministerio de la Tierra, la Infraestructura y los Transportes), los gobiernos locales (Jeolabuk-do, Gunsan-city, Buan-gun, etc.), La Corporación de Desarrollo de Saemangeum, las instituciones públicas locales y los ejecutivos de proyectos privados. La Agencia de Desarrollo y Inversión de Saemangeum (SDIA) está a cargo de todo el proyecto para la conclusión exitosa. La SDIA necesita una gestión avanzada del programa Saemangeum (se llama "K-SPM") para abordar cuestiones complejas como la falta de un alcance claro y el momento de la extinción, una alta dependencia de la inversión privada, cambios frecuentes en las políticas y confrontación entre muchos participantes. En este estudio se propone introducir el establecimiento de procedimientos, la gestión del tiempo y los costes, los esfuerzos por el desarrollo de un mega proyecto que desarrolle un sistema de información sobre la gestión de programas y la dirección del desarrollo de K-SPM.
PALABRAS CLAVE: Saemangem Development. Megaproyecto. Gestión de programas.

1 INTRODUCTION

The Megaproject "Saemangeum development" is a national program of South Korea to build "a Global Treasure Saemangeum" that will emerge as the economic hub of Northeast Asia, encompassing the economy, business and tourism. Saemangeum development is to include the world's longest seawall (33.9km) from Gunsan to Buan that creates 291km^2 reclaimed land and a lake as large as 118km^2 in addition to 3.3km^2 on Gogunsangun Island and 4.9km^2 developed as a new port outside the seawall [1].

Figure 1: Saemangeum development introduce.



At first, the government started to secure 283km^2 of farmland and 118km^2 of lake in Gunsan, Gimje, and Buangun under the plan of reclamation of common water in the Dongjin and Mangyeong rivers to secure stable food. Since then, due to social, economic, and political changes, it has been converted from farmland development to 30% of farmland and 70% of non-farm land since 2008 for the purpose of creating eco-friendly multi-use urban land. Recently, major infrastructure has begun to be developed in earnest and public-led landfills have been converted into full-scale development [2] [5].

Table 1. Transition of Saemangeum development strategy.

Sortation	2007	2008	2010	2011	2014	2021
Legal basis	Special Law to Promote Saemangeum Development				Special Law	
Department	Each Central Department				SDIA*	
Goal	Securing farmland	Development of Northeast Asian Economic Center				
Strategy	Sequential development	Simultaneous development				
Period	until water quality is satisfied	Separate stage 1 and stage 2				by 2050
Area(km^2)	401.0				409.0	
Agro-Bio	161.0	85.7	85.7	85.7	89.7	
City	50.5	62.5	92.8	126.3	133.9	
Eco-Environment	30.0	59.5	59.5	59.5	59.1	
Etc.	41.5	75.3	45.0	11.5	8.3	
Lake	118.0					

*SDIA: Saemangeum Development and Investment Agency.

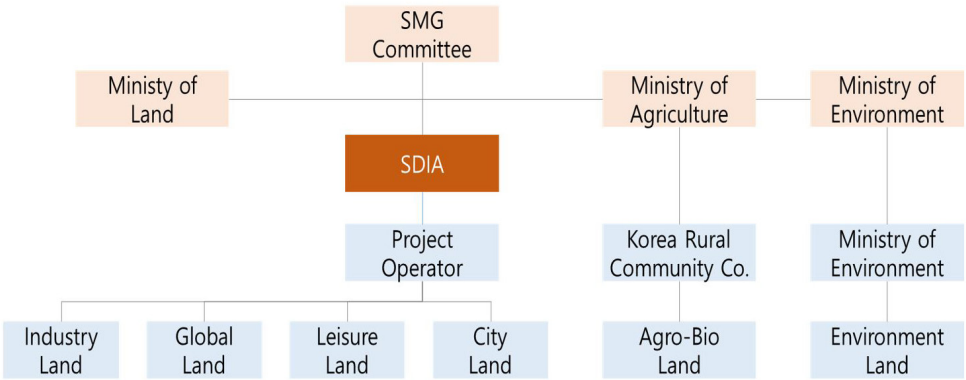
2 PROGRAM MANAGEMENT NEED AND APPLICATION

2.1 PROGRAM MANAGEMENT NEED

Saemangeum development is a simultaneous and complex program participating government ministries (Ministry of Agriculture, Environment, Saemangeum Development Agency, etc.), local governments (Jeonbuk-do, Gunsan-si, Gimje-si, Buan-gun), Saemangeum Development Corporation, local public institutions, and private developers, etc.

In addition, Saemangeum development agency supports the execution of general management tasks and investment attraction, and promotes infrastructure (roads) and architectural facilities (museum, etc.) to revitalize investment. A program management techniques were needed for integrated and systematic operation of various program entities.

Figure 2: Saemangeum development participating organization.



*SMG: Saemangeum.

However, the Saemangeum development program was difficult to apply general project management techniques due to the absence of project implementers, frequent policy changes, and conflicts among many stakeholders. As a result, Saemangeum development program management required differentiated management techniques from the existing project management methods, and this program management is called K-SPM (korea-Saemangeum program management) and the current K-SPM introduction process and status will be explained.

2.2 PROGRAM MANAGEMENT APPLICATION

For K-SPM suitable for the characteristics of Saemangeum development program, Saemangeum development administration conducted “a study on the establishment of

Saemangeum development program management plan (January 2017)" and "a program management procedure (February 2020)". Based on these, it is currently under pilot operation of program management (Jun 2020~April 2021).

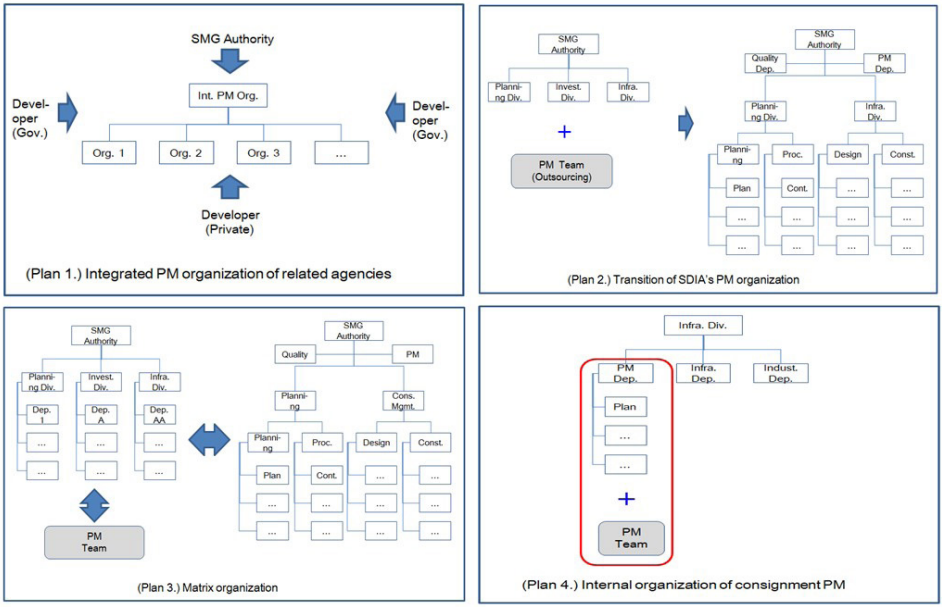
First of all, "Saemangeum development program management plan establishment study" presented a method of gradually implementing the program management functions of urban development projects similar to Saemangeum program aiming at the performance of the entire program rather than the success or failure of a particular project [3] [4].

Table 2. Program management function.

Program management function	Priority application of K-SPM function
- Business planning - Scope management - Data management - Construction management - Risk management - Environmental management - Process management - Marketing support - Program cost management - Design management - Program information management - Claim management, etc.	- Scope management - Data management - Process management - Program cost management - Program information management

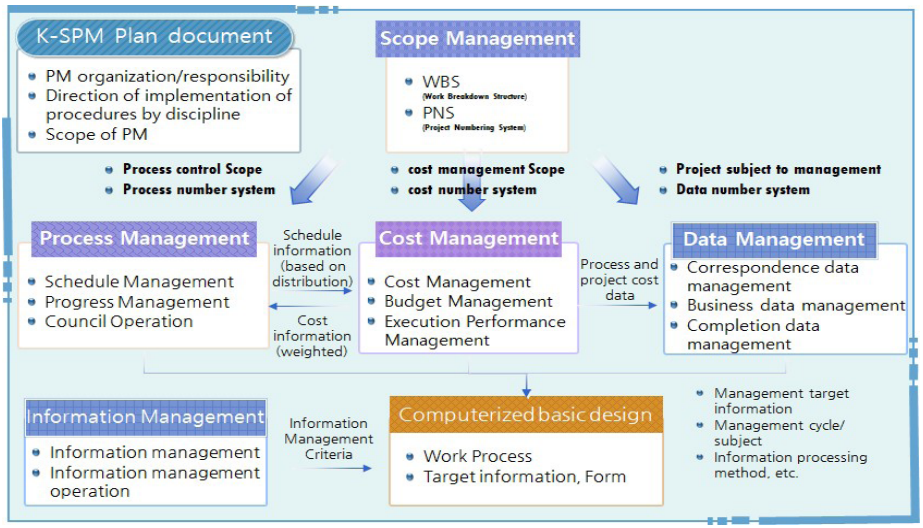
In addition, K-SPM's necessary organization consists of human resources with expertise and experience, and based on the Saemangeum development administration's manpower structure, it was determined that the most realistic way of supporting program management technology was.

Figure 3: K-SPM's necessary organization consists.



Based on the Saemangeum development program management plan, five kinds of procedures (program scope management, program document management, program time management, program cost management, and program information management) were established to carry out K-SPM in earnest. The five types of procedures shall promote the stipulation and clarification of the responsibilities and roles associated with the implementation of program management, and the details of each procedure shall be as follows [6]:

Figure 4: K-SPM 5 kinds of procedures.



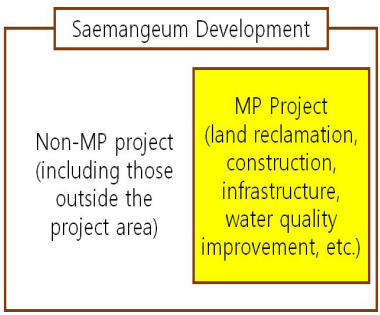
3 K-SPM OPERATE

Currently, K-SPM focuses on time and costs as an early stage of introduction, and first, it has prepared a plan to set up and manage program management targets and scope. It is also developing a K-SPM system to efficiently manage the landfill plan for the creation of land and to organize a consultative body on various pending issues and manage the vast information of large-scale programs.

3.1 K-SPM SCOPE SETTING

K-SPM shall perform program management for individual project entities pursuant to article 12-2 of the Saemangeum special act (General, Management, etc.). The scope of eligible program shall be managed in the Saemangeum area defined under article 2 of the special act and, if necessary, the entire Saemangeum program, including adjacent surrounding areas. Considering the initial stage of introduction, the statutory plan (basic plan) program was designated as a program subject to management.

Table 3. K-SPM management scope.

Sort			Scope
MP	Land build	Industry, International, Tourism, Agricultural life, Environment	
	Infrastructure	Airports, Roads, Railways, Ports, Supply facilities	
Non-MP	Renewable energy	Solar, Wind, Fuel cells	
	Individual business	Industrial, Research, and Other Private Architecture	
	Seawall	Seawall	
Outside the area	Related Project	Highway, External railway	

However, programs other than those subject to management also require minimal management. So each management depth is set to be managed, and the management plan will be prepared and expanded step by step after stable K-SPM operation.

Table 4. K-SPM management level.

Scope	Management level
MP	Periodically (weekly, monthly) management of progress, project costs, various reports, etc.
Non-MP	Undertake and completion status management according to investment agreement and tenant agreement
Outside the area	Management of progress status by project for smooth connection promotion

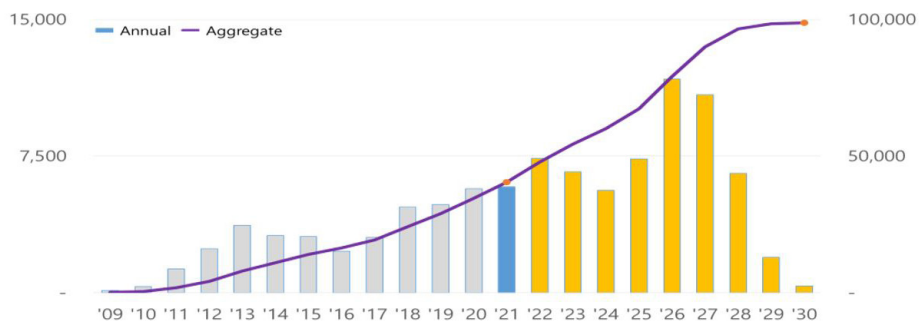
3.2 PROGRAM COST AND TIME MANAGEMENT

3.2.1 Program cost management

In the case of general program cost management, the program cost plan was established and managed with the aim of timely completion of the program period and investment amount, but in the case of Saemangeum program, the detailed plan (not designated as a project implementer) was not finalized.

Therefore, Saemangeum investment plan was established by collecting information on the period, cost, and performance of program (completion, progress, and plan) for which the plan was finalized. Program cost management was carried out by reviewing the change flow generated during the management process, such as new program, and re-establishing them once a year.

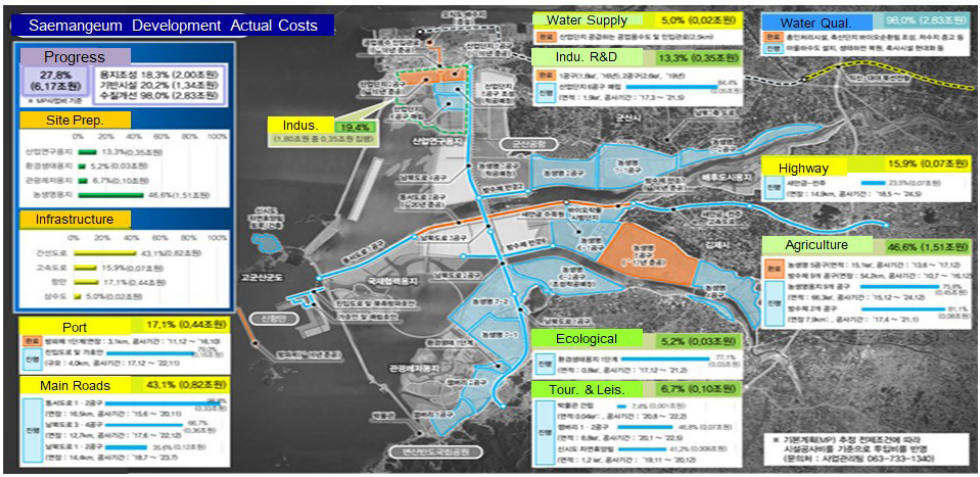
Figure 5: Analyzing the established investment plan.



As a result of analyzing the established investment plan, facilities and site development projects to support the hosting of the World Jamboree Conference was actively in progress until 2028. And the annual investment volume has increased due to the launch of large-scale projects (Circular Ring and Gunsan-Saemangeum Railway) from 2026 to 2027. The plan is to induce a timely start schedule for new program (2023-2025 or after 2028) to continue the Saemangeum program and prevent excessive budget execution.

The establishment of an investment plan is the basis for program cost management and determines whether the program is proceeding normally through performance management. In the event of a delay, the degree of impact with neighboring (or related) program can be determined. Reassembling the changed information is carried out once a year. In addition, the monthly execution performance collected is used as a data to review whether the total program cost (US$ 19.65 billion) is exceeded and to determine the progress.

Figure 6: The monthly cost review.



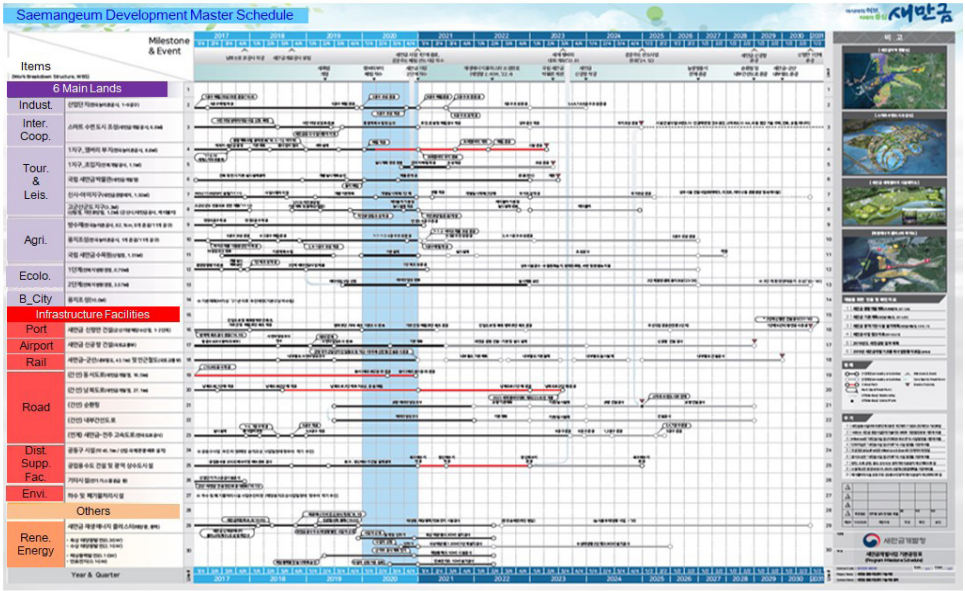
3.2.2 Time management

Program time management is an absolutely necessary management technique for comprehensive program management, such as reviewing performance compared to plan and reviewing impact on delayed program, by establishing a reasonable program plan. In particular, change-prone program such as the Saemangeum development program require periodic management of the master schedule and the management standard schedule, and review of progress management measures suitable for the Saemangeum development program was required.

First of all, the master schedule can be reviewed the main plan and the current status of the Saemangeum program as a schedule for the top class. The establishment of the initial schedule was generally a top-down method based on the program plan, but considering the characteristics of the Saemangeum program, which has a high proportion of private portion and frequent changes in plans. Therefore the bottom-up method was applied.

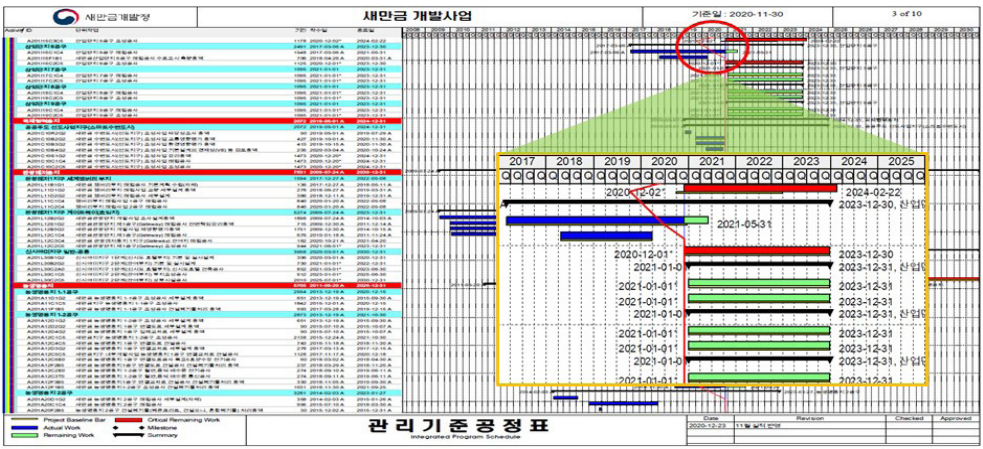
The master schedule was established until 2030, which was based on the currently planned project and was necessary to set up milestones for intensive management such as the World jamboree, Smart waterfront city, New port, and Saemangeum new airport. The established milestone was selected as the main management target for related projects such as site construction projects and adjacent roads for implementation, and the process status is being considered so that it can be completed in a timely manner.

Figure 7: Saemangeum master schedule.



The management standard schedule was established to analyze the progress performance of the Saemangeum program and the linkage between the unit activities and the progress of the program plan. Schedule preparation was established by collecting detailed unit project plans of each project entity. The established master schedule shall be managed by reviewing the schedule such as delay and early start of the program by identifying the exact progress status and reviewing the schedule of the progress program. In addition, it is managed as a procedure to review the interference of related projects in case of delay through schedule review and prepare alternatives in case of interference, and continuous monitoring is carried out.

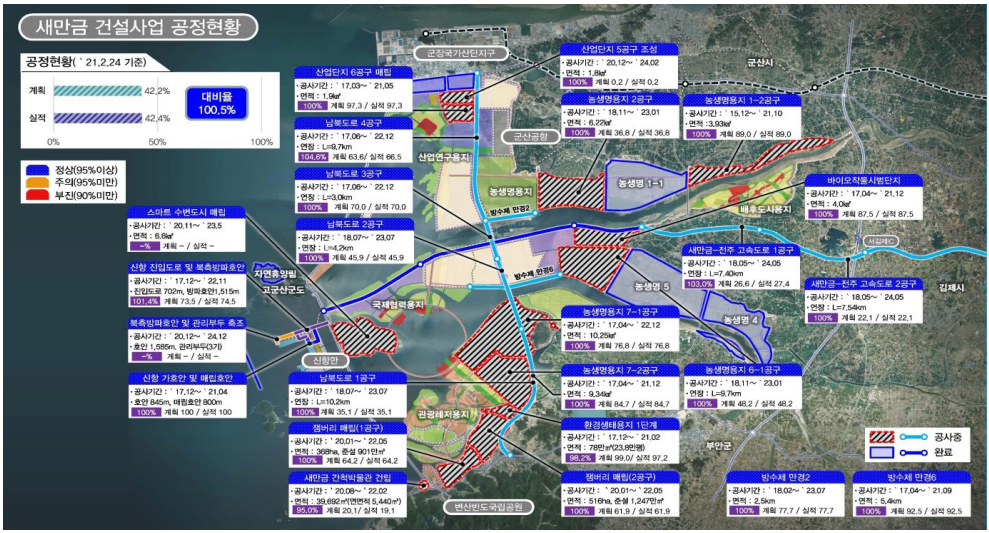
Figure 8: Saemangeum management standard schedule.



The established schedule (basic and management standard schedule) is the basis for time management, and performance management is performed by analyzing the overall progress status and progress status of Saemangeum program through performance aggregation.

In addition, progress performance compared to the fair plan is prepared with a management rating system (normal over 95%, 90% to 95% attention, and sluggish less than 90%) so that the program can be carried out normally through review of the reasons for sluggishness and countermeasures.

Figure 9: Saemangeum progress review.



3.2.3 Other management (Lang reclamation, Council, System)

Saemangeum land reclamation is a program to be created by utilizing the amount of non-existence (682,806,000m^3, sea sand soil, and lake soil) around Saemangeum after the construction of the seawall. A distribution plan for the appropriate procurement of reclaimed land at the beginning of the program ("Guidelines for dredging land management in appeals for Saemangeum development projects") was established. The established management guidelines require the prevention of excessive cutting in certain areas and the management of existing landfill status when changing the management depth in the future, and review the landfill performance and dredging location every month.

Issues such as interferences and improvements in the program cost and time management analysis or program management operation process need to be discussed between each department in charge, and a quarterly program management consultative body is operated. These program management consultative bodies are operated

for information sharing and mutual cooperation among institutions participating in Saemangeum program to promote the efficiency of K-SPM. It is also operated with the aim of coordinating overlapping and interference between individual projects and preventing budget waste factors in advance. It has been held nine times since 2018 and has drawn 43 agenda items.

Table 5. Operation of the K-SPM council.

Operation of the K-SPM council		
- Request for the establishment of a legal basis for the operation of the first stage of the environmental ecological site - Request for the establishment of a second stage access road for environmental ecological sites - Request for water supply plan in Smart waterfront city and New port - Requests for registration of land for improvement of private investment environment. etc. 43 cases	**Type**	**Agenda**
	Sum	43
	Cooperation	20
	Long-term review	14
	Schedule	5
	Improvement	4

In addition, after reviewing the council's agenda by type, 20 out of 43 consultations were the highest, and management of various participating institutions was an important factor for smooth Saemangeum development. The Saemangeum program, where various related entities and projects are carried out, is also very large in the amount of program information generated during the progress, and the development of the system is desperately needed to manage it efficiently. Therefore, basic design and system configuration strategies have been reviewed for system development, and current 2021 has been carried out. It is in progress with the goal of completing development.

Key considerations shall be given to supporting the performance of program management, strengthening cooperation among participants, establishing a current status and monitoring system, and details shall be as shown in the following table.

Table 6. K-SPM system strategy.

K-SPM Support	- Establishment of information management system for systematic and active K-SPM support - Efficiently manage and provide real-time information - Provide report, electronic sign, information renewal, progress reporting, work support functions, etc. - Maximize work efficiency - Process prediction
Reinforce collaboration	- Provide data and share information - Organic linkage of information and communication activities - Minimize user redundancy and simplify information management - Link information from individual systems

Establishing a current status and monitoring system	- Automation of various status and statistics such as schedule, progress rate, budget, project cost, etc. - Improved visibility with graphics processing on dashboard -Integrates complex project information to provide comprehensive capabilities - Consider dashboard features that are easy to edit

In addition, the system is established so that not only participants, contractors, and management departments, but also ordinary people interested in Saemangeum program to attract investment can be utilized. It is currently developing a system with different levels of information disclosure depending on the level of access to the system.

4 CONCLUSION

As a result of the current K-SPM introduction, the program time and cost management standards were prepared, including the establishment of program management targets for Saemangeum development program, establishment of project cost investment plans, and preparation of various schedules. Management of landfill status, information sharing of participating parties and discovery and management of pending issues were carried out.

However, the presence of complex and diverse program participants in the K-SPM process limited the collection of program information. To address this, an efficient, controllable legal basis (or establishment of implementation guidelines) is under consideration. It is also expected that efficient K-SPM will be carried out when system development is completed in 2021. K-SPM plans to expand operation step by step, such as risk management, in addition to time and cost management. Also, it plans to manage inter-program interference and redundancy prevention and governance among participants so that can be developed efficiently.

The experience and technology accumulated through the continuous introduction of K-SPM can be used for large-scale urban construction programs that will be carried out not only in Korea but also abroad, and will contribute to the development of construction program management. It will also continue to make efforts to become a global success case by introducing successful program management in Saemangeum development.

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SOBRE O ORGANIZADOR

Xosé Somoza Medina (1969, Ourense, España) Licenciado con Grado y premio extraordinario em Geografía e Historia por la Universidad de Santiago de Compostela (1994). Doctor en Geografía e Historia por la misma universidad (2001) y premio extraordinario de doctorado por su Tesis "Desarrollo urbano en Ourense 1895-2000". Profesor Titular en la Universidad de León, donde imparte clases desde 1997. En la Universidad de León fue Director del Departamento de Geografía entre 2004 y 2008 y Director Académico de la Escuela de Turismo entre 2005 y 2008. Entre 2008 y 2009 ejerció como Director del Centro de Innovación y Servicios de la Xunta de Galicia en Ferrol. Entre 2007 y 2009 fue vocal del comité "Monitoring cities of tomorrow" de la Unión Geográfica Internacional. En 2012 fue Director General de Rehabilitación Urbana del Ayuntamiento de Ourense y ha sido vocal del Consejo Rector del Instituto Ourensano de Desarrollo Local entre 2011 y 2015. Ha participado en diversos proyectos y contratos de investigación, en algunos de ellos como investigador principal, con temática relacionada con la planificación urbana, la ordenación del territorio, las nuevas tecnologías de la información geográfica, el turismo o las cuestiones demográficas. Autor de más de 100 publicaciones relacionadas con sus líneas de investigación preferentes: urbanismo, turismo, gobernanza, desarrollo, demografía, globalización y ordenación del territorio. Sus contribuciones científicas más importantes se refieren a la geografía urbana de las ciudades medias, la crisis del medio rural y sus posibilidades de desarrollo, la evolución del turismo cultural como generador de transformaciones territoriales y más recientemente las posibilidades de reindustrialización de Europa ante una nueva etapa posglobalización. Ha participado como docente en masters y cursos de especialización universitaria en Brasil, Bolivia, Colombia, Paraguay y Venezuela y como docente invitado en la convocatoria Erasmus en universidades de Bulgaria (Sofia), Rumanía (Bucarest) y Portugal (Porto, Guimarães, Coimbra, Aveiro y Lisboa). Ha sido evaluador de proyectos de investigación en la Agencia Estatal de Investigación de España y en la Organización de Estados Iberoamericanos (OEI). Como experto europeo en Geografía ha participado en reuniones de la Comisión Europea en Italia y Bélgica. Impulsor y primer coordinador del proyecto europeo URBACT, "come Ourense", dentro del Programa de la Unión Europea "Sostenibilidad alimentaria en comunidades urbanas" (2012-2014). Dentro de la experiencia en organización de actividades de I+D+i se pueden destacar la organización de diferentes reuniones científicas desarrolladas dentro de la Asociación de Geógrafos Españoles (en 2002, 2004, 2012 y 2018).

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